



REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For Receiving Office use only

International Application No.

International Filing Date

30 SEP 2004

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) TPP 31446PCT

| | |
|--|--|
| Box No. I TITLE OF INVENTION FLEXIBLE CONTAINMENT CHARGING DEVICE | |
| Box No. II APPLICANT <input type="checkbox"/> This person is also inventor | |
| Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.) ILC DOVER, INC. One Moonwalker Road Frederica, Delaware 19946 US | |
| Telephone No. | |
| Facsimile No. | |
| Teleprinter No. | |
| Applicant's registration No. with the Office | |
| State (that is, country) of nationality: US | State (that is, country) of residence: US |
| This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input checked="" type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box | |
| Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S) | |
| Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.) MANLOVE, Lance Fuller 22232 Shore Drive Seaford, Delaware 19973 US | |
| This person is: <input type="checkbox"/> applicant only <input checked="" type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.) | |
| Applicant's registration No. with the Office | |
| State (that is, country) of nationality: | State (that is, country) of residence: |
| This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box | |
| <input type="checkbox"/> Further applicants and/or (further) inventors are indicated on a continuation sheet. | |
| Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE | |
| The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: <input checked="" type="checkbox"/> agent <input type="checkbox"/> common representative | |
| Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) PAVELKO, Thomas P. STEVENS, DAVIS, MILLER & MOSHER, L.L.P. 1615 L Street, N.W., Suite 850 Washington, D.C. 20036 US | |
| Telephone No. 202/785-0100 | |
| Facsimile No. 202/408-5200 or 202/408-5088 | |
| Teleprinter No. | |
| Agent's registration No. with the Office 31,689 | |
| <input type="checkbox"/> Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent. | |

Box No. V

DESIGNATION

STATES

Mark the applicable check-boxes below. At least one must be marked.

The following designations are hereby made under Rule 4.9(a):

Regional Patent

- ☒ **AP ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, MZ Mozambique, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZM Zambia, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT (if other kind of protection or treatment desired, specify on dotted line)
- ☒ **EA Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of
- ☒ **EP European Patent:** AT Austria, BE Belgium, BG Bulgaria, CH & LI Switzerland and Liechtenstein, CY Cyprus, CZ Czech Republic, DE Germany, DK Denmark, EE Estonia, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, SI Slovenia, SK Slovakia, TR Turkey, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GQ Equatorial Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | | |
|---|--|---|
| <input checked="" type="checkbox"/> AE United Arab Emirates | <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> AG Antigua and Barbuda | <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> OM Oman |
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> PH Philippines |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> PL Poland |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> RO Romania |
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| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> KR Republic of Korea | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> BZ Belize | <input checked="" type="checkbox"/> KZ Kazakhstan | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> LC Saint Lucia | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> CH & LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> LR Sri Lanka | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> CN China | <input checked="" type="checkbox"/> LT Lithuania | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> CO Colombia | <input checked="" type="checkbox"/> LU Luxembourg | <input checked="" type="checkbox"/> TN Tunisia |
| <input checked="" type="checkbox"/> CR Costa Rica | <input checked="" type="checkbox"/> LV Latvia | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> MA Morocco | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> CZ Czech Republic | <input checked="" type="checkbox"/> MD Republic of Moldova | |
| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> MG Madagascar | <input checked="" type="checkbox"/> TZ United Republic of Tanzania |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> DM Dominica | <input checked="" type="checkbox"/> MN Mongolia | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> DZ Algeria | <input checked="" type="checkbox"/> MW Malawi | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> EC Ecuador | <input checked="" type="checkbox"/> MX Mexico | |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> MZ Mozambique | <input checked="" type="checkbox"/> UZ Uzbekistan |
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| <input checked="" type="checkbox"/> GB United Kingdom | | <input checked="" type="checkbox"/> YU Yugoslavia |
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Check-boxes below reserved for designating States which have become party to the PCT after issuance of this sheet:

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| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

Box No. VI PRIORITY CLAIM

The priority of the following earlier application(s) is hereby claimed:

| Filing date of earlier application (day/month/year) | Number of earlier application | Where earlier application is: | | |
|---|----------------------------------|--|---|--|
| | | national application: country or Member of WTO | regional application:* regional Office | international application: receiving Office |
| item (1) 01 April 2002 | 60/368,537 | | USPTO | |
| item (2) | | | | |
| item (3) | | | | |
| item (4) | | | | |
| item (5) | | | | |

☐ Further priority claims are indicated in the Supplemental Box.

The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of this international application is the receiving Office) identified above as:

☐ all items
 ☒ item (1)
 ☐ item (2)
 ☐ item (3)
 ☐ item (4)
 ☐ item (5)
 ☐ other, see Supplemental Box

* Where the earlier application is an ARIPO application, indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed (Rule 4.10(b)(ii)):

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

ISA/ USPTO

Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day/month/year) Number Country (or regional Office)

Box No. VIII DECLARATIONS

The following **declarations** are contained in Boxes Nos. VIII (i) to (v) (mark the applicable check-boxes below and indicate in the right column the number of each type of declaration):

Number of
declarations

- | | | |
|---|--|---|
| <input type="checkbox"/> Box No. VIII (i) | Declaration as to the identity of the inventor | : |
| <input type="checkbox"/> Box No. VIII (ii) | Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent | : |
| <input type="checkbox"/> Box No. VIII (iii) | Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application | : |
| <input type="checkbox"/> Box No. VIII (iv) | Declaration of inventorship (only for the purposes of the designation of the United States of America) | : |
| <input type="checkbox"/> Box No. VIII (v) | Declaration as to non-prejudicial disclosures or exceptions to lack of novelty | : |

Box No. IX CHECK LIST; LANGUAGE OF FILING**This international application contains:**(a) **in paper form**, the following number of sheets:

request (including declaration sheets) : 5
 description (excluding sequence listings and/or tables related thereto) : 5
 claims : 3
 abstract : 1
 drawings : 3

Sub-total number of sheets : 17

sequence listings :

tables related thereto :

(for both, actual number of sheets if filed in paper form, whether or not also filed in computer readable form; see (c) below)

Total number of sheets : 17

(b) ☐ **only in computer readable form** (Section 801(a)(i))(i) ☐ sequence listings(ii) ☐ tables related thereto(c) ☐ **also in computer readable form** (Section 801(a)(ii))(i) ☐ sequence listings(ii) ☐ tables related thereto

Type and number of carriers (diskette, CD-ROM, CD-R or other) on which are contained the

☐ sequence listings:☐ tables related thereto:

(additional copies to be indicated under items 9(ii) and/or 10(ii), in right column)

This international application is accompanied by the following item(s) (mark the applicable check-boxes below and indicate in right column the number of each item):

- | | Number of items |
|---|-----------------|
| 1. <input checked="" type="checkbox"/> fee calculation sheet | 1 |
| 2. <input checked="" type="checkbox"/> original separate power of attorney | 1 |
| 3. <input type="checkbox"/> original general power of attorney | |
| 4. <input type="checkbox"/> copy of general power of attorney; reference number, if any: | |
| 5. <input checked="" type="checkbox"/> statement explaining lack of signature | 1 |
| 6. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): | |
| 7. <input type="checkbox"/> translation of international application into (language): | |
| 8. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material | |
| 9. <input type="checkbox"/> sequence listings in computer readable form (indicate type and number of carriers) | |
| (i) <input type="checkbox"/> copy submitted for the purposes of international search under Rule 13ter only (and not as part of the international application) | |
| (ii) <input type="checkbox"/> (only where check-box (b)(i) or (c)(i) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Rule 13ter | |
| (iii) <input type="checkbox"/> together with relevant statement as to the identity of the copy or copies with the sequence listings mentioned in left column | |
| 10. <input type="checkbox"/> tables in computer readable form related to sequence listings (indicate type and number of carriers) | |
| (i) <input type="checkbox"/> copy submitted for the purposes of international search under Section 802(b-quater) only (and not as part of the international application) | |
| (ii) <input type="checkbox"/> (only where check-box (b)(ii) or (c)(ii) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Section 802(b-quater) | |
| (iii) <input type="checkbox"/> together with relevant statement as to the identity of the copy or copies with the tables mentioned in left column | |
| 11. <input type="checkbox"/> other (specify): | |

Figure of the drawings which should accompany the abstract: Fig. 1

Language of filing of the international application: English

Box No. X SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).



Thomas P. Pavelko
Agent

For receiving Office use only

1. Date of actual receipt of the purported international application:

3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:

4. Date of timely receipt of the required corrections under PCT Article 11(2):

5. International Searching Authority (if two or more are competent): ISA/

6. ☐ Transmittal of search copy delayed until search fee is paid

2. Drawings:

☐ received:☐ not received:**For International Bureau use only**

Date of receipt of the record copy
by the International Bureau:

PCT**FEE CALCULATION SHEET****Annex to the Request**

For receiving Office use only

International Application No.

Applicant's or agent's
file reference

TPP 31446PCT

Date stamp of the receiving Office

Applicant

ILC DOVER, INC. et al

CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE

240.00 T

2. SEARCH FEE

450.00 S

International search to be carried out by USPTO

(If two or more International Searching Authorities are competent to carry out the international search, indicate the name of the Authority which is chosen to carry out the international search.)

3. INTERNATIONAL FEE

Basic Fee

Where item (b) and/or (c) of Box No. IX apply, enter Sub-total number of sheets

17

Where item (b) and (c) of Box No. IX do not apply, enter Total number of sheets

b1 first 30 sheets 407.00 b1

b2 0 x = 0.00 b2
number of sheets in excess of 30 fee per sheet

b3 additional component (only if sequence listings and/or tables related thereto are filed in computer readable form under Section 801(a)(i), or both in that form and on paper, under Section 801(a)(ii)):

400 x = b3
fee per sheet

Add amounts entered at b1, b2 and b3 and enter total at B 407.00 B

Designation FeesThe international application contains 5+ designations.5 x 88.00 = 440.00 D
number of designation fees payable (maximum 5) amount of designation fee

Add amounts entered at B and D and enter total at I 847.00 I

(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the

4. FEE FOR PRIORITY DOCUMENT (if applicable) 20.00 P

5. TOTAL FEES PAYABLE 1,557.00

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

TOTAL

☐ The designation fees are not paid at this time.**MODE OF PAYMENT**

- ☐ authorization to charge deposit account (see below) ☐ postal money order ☐ cash ☐ coupons
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AUTHORIZATION TO CHARGE (OR CREDIT) DEPOSIT ACCOUNT

(This mode of payment may not be available at all receiving Offices)

☐ Authorization to charge the total fees indicated above.☒ (This check-box may be marked only if the conditions for deposit accounts of the receiving Office so permit) Authorization to charge any deficiency or credit any overpayment in the total fees indicated above.☐ Authorization to charge the fee for priority document.Receiving Office: RO/ USPTODeposit Account No.: 19-4375Date: March 17, 2003Name: Thomas P. PavelkoSignature: [Signature]

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

ILC DOVER, INC. et al

ATTN: PCT Branch

Serial No.: To be assigned

Filed: March 17, 2003

For: FLEXIBLE CONTAINMENT CHARGING DEVICE


STATEMENT EXPLAINING LACK OF SIGNATURE

Honorable Commissioner of
Patents and Trademarks
Attn: PCT Branch
Washington, D.C. 20231

Dear Sir:

The enclosed PCT International Application is accompanied by a Power of Attorney, which is not signed by the applicants/inventors. The applicants/inventors were not available to sign the Power of Attorney at the present time. However, their signatures shall be diligently pursued and a Power of Attorney signed by the applicants/inventors will be filed in due course.

Respectfully submitted,



Thomas P. Pavelko
Registration No. 31,689

TPP:mat
Attorney Docket No.: TPP 31446PCT

STEVENS, DAVIS, MILLER & MOSHER, L.L.P.
1615 L Street, N.W., Suite 850
Washington, D.C. 20036
Telephone: (202) 785-0100
Facsimile: (202) 408-5200 or (202) 408-5088

Date: March 17, 2003

PCT

POWER OF ATTORNEY

(for an international application filed under the Patent Cooperation Treaty)

(PCT Rule 90.4)

The undersigned applicant(s) (*Names should be indicated as they appear in the request*):

ILC DOVER, INC.
MANLOVE, Lance Fuller

hereby appoints (appoint) the following person as:



agent



common representative

Name and address

(*Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.*)

PAVELKO, Thomas P.
STEVENS, DAVIS, MILLER & MOSHER, L.L.P.
1615 L Street, N.W., Suite 850
Washington, D.C. 20036
Telephone: (202) 785-0100
Facsimile: (202) 408-5200 or (202) 408-5088

to represent the undersigned before



all the competent International Authorities



the International Searching Authority only



the International Preliminary Examining Authority only

in connection with the international application identified below:

Title of the invention: FLEXIBLE CONTAINMENT CHARGING DEVICE

Applicant's or agent's file reference: TPP 31446PCT

International application number (if already available):

filed with the following Office USPTO as receiving Office
and to make or receive payments on behalf of the undersigned.

Signature of the applicant(s) (*where there are several applicants, each of them must sign; next to each signature, indicate the name of the person signing and the capacity in which the person signs, if such capacity is not obvious from reading the request or this power*):

ILC DOVER, INC.

by: _____

Lance Fuller Manlove

Date: _____

FLEXIBLE CONTAINMENT CHARGING DEVICE

Background of the Invention

The present invention relates to a film based material transfer device, with an integrated restraint system that protects the process operator and environment from the potent or otherwise harmful, and/or toxic substances contained within it, as well as a method for producing the film based material transfer device.

Description of the Related Art

Material transfer devices for potent compounds used in the pharmaceutical industry are typically constructed of rigid polymer bottles that can be integrated directly to a passive half of a split butterfly valve. These devices allow filling and/or discharging of potent substances in a contained manner when mated to the active half of a split butterfly valve. The rigid polymer bottles are strong enough to withstand limited pressurization during operation of the valve, during both filling and discharge.

However, such systems present problems with respect to product flow when certain powder substances are used, for example, fine chemicals, toxic and/or hazardous waste, pharmaceutical dry powder compositions, pharmaceutical intermediate processing compounds, laboratory and pilot plant pharmaceutical compounds, as well as pharmaceutical wet-cake material. Additionally, conventional containment charge devices prohibit visual verification that the system has been completely emptied of, or completely filled with, the potent product.

Other conventional transfer devices utilize a film enclosure that integrates to a sanitary fitting. This fitting can also be connected to a passive half of a split butterfly valve and used as above. While the film may be transparent to allow visual verification that the potent substance has been discharged, and the flexibility may allow for manual manipulation of the system to enhance product flow out of the device, such systems may only be used on a small product volume basis due to requirements such as material strength. Additionally, use of the conventional film enclosures is generally limited to non-pressurized environments to avoid the potential rupture of the film, breach of the containment device and the potential for release of the harmful, often toxic, material into the environment.

Despite the advantages of the conventional containment discharging devices, such systems provide no means of grounding to eliminate any static electric charge that can build-up while filling or discharging the substance, thus presenting a hazardous situation in solvent vapor environments.

Therefore, there exists a need in the art for a containment device which is integrated with a sanitary valve, that can withstand pressurizations during filling and/or discharge, as well as being flexible enough to permit manual manipulation to assist the filling and/or discharge, while simultaneously permitting visual inspection of the contents disposed therein.

Summary of the Invention

A process for integrating a flexible film based liner into a woven fabric restraint has been developed to transfer potent or toxic substances in a contained manner. The integration of the fabric restraint allows the system to withstand limited pressurization. The restraint not only adds strength to the system while maintaining flexibility but also protects the liner from breach of containment due to puncture. The film liner maybe welded to a polymer sanitary fitting that can be integrated to a passive half of a split butterfly valve. The flexible nature of the device allows the operator to manually massage the potent powder substance to enhance flow characteristics when emptying the device. The restraint can be fabricated of conductive or non-conductive material. If constructed from conductive material this will allow grounding of the device to eliminate static charge build-up while filling or discharging.

Brief Description of the Drawings

Fig. 1 is a representation of the flexible film liner assembly that forms the inner, containment layer of the charging device.

Fig. 1a is a top view of the structure of Fig. 1.

Fig. 2 is a representation of the woven fabric restraint assembled with the film liner. This provides both a pressure retaining capability of the system and protection from damage.

Fig. 2a is a top view of the structure of Fig. 2.

Fig. 3 is a section detail along lines A-A of Fig. 2 illustrating the stitched integration of the film liner to the restraint along with the lifting loop.

Detailed Description of the Preferred Embodiments

The flexible charging device 1 of the invention utilizes an inner liner 10 of Fig. 1. Typically, inner liner 10 is fabricated from a thin impermeable film of polymer material. The shape of inner liner 10 may be constructed from patterns that are thermally welded or sewn to form a sealed structure together at joints 11 or provided as a single unit, having no welded joints. Inner liner 10 is also, preferably, thermally welded to a sanitary fitting 12. For example, inner liner 10 may contain one or more sewn seams as described in U.S. Application No. 09/666,845, herein incorporated by reference in its entirety. However, inner liner 10 may be joined to sanitary fitting 12 by any known, or later developed, method, including sewing or joining with an adhesive. This assures a totally sealed fabrication that eliminates crevices where toxic substance can get trapped. Although Fig. 1 depicts inner liner 10 as having a specific shape, it is understood that, preferably, inner liner 10 is a flexible material, conforming generally to the shape of its contents and/or the container.

Sanitary fitting 12 may be any structure capable for forming a substantially sealed joint with a filling device (not shown) such as an active or passive half split of a butterfly valve, and is preferably formed from a thermoplastic, such as a polyolefin. In one embodiment, sanitary fitting 12 is provided with sealing means, such as O-rings or locking members, to form an airtight seal with the filling device. Optionally, sanitary fitting 12 includes means for sealing to prevent the escape of any material contained in flexible charging device 1, i.e., the load.

Although a wide variety of materials are suitable for inner liner 10, typically, inner liner 10 is constructed of a thermoplastic film, such as a polyolefin. In addition, inner liner 10 may also include one or more barrier layers. Such barrier layers can prevent chemical fluid or vapor introduction/escape, light inhibition, or other barrier layers to prevent contact of the contents of the liner with the environment.

In one embodiment, inner liner 10 may be any thin flexible material, e.g., a woven or non-woven fabric, coated with at least one polymer layer, and optionally, a chemical barrier layer. When inner liner 10 is such a structure, the thin flexible material need not be

impervious to the material disposed within flexible charging device 1, as the polymer layer should perform such a function. If the thin flexible material, coated with a polymer, provides the structure necessary to maintain the integrity of inner liner 10, the thickness of the polyolefin layer may be reduced. Typically, the polymer layer of inner liner 10 is a thermoplastic material, such as a polyolefin, for example, polyethylene, polypropylene or polybutylene.

As shown in Figs. 2 and 3, inner liner 10 is integrated to an outer fabric restraint 13. In one embodiment, fabric restraint 13 is provided with window 18, integrated into the side. A user may use window 18 to verify that all the contained substance has been emptied from the device during discharge. Window 18 is typically sewn over an opening in fabric restraint 13, using a thread, or may simply be thermally sealed to fabric restraint 13. Although inner liner 10 is a flexible material, which, in most situations will conform to the shape provided by the contents thereof, window 18 may include a second element providing observation through inner liner 10 as well. Accordingly, window 18 may include a seam, joining an aperture through both fabric restraint 13 and inner liner 10.

Similar to inner liner 10, fabric restraint 13 is preferably a polymeric material, such as a homopolymer or copolymer or blends of plastic material, such as a thermoplastic material, typically a polyolefin. The polyolefin may be an optionally substituted linear or branched material, for example, polyethylene, polypropylene or polybutylene. Although fabric restraint 13 may be formed from the same material as inner liner 10, typically, fabric restraint 13 is a woven polypropylene fabric.

In one embodiment, fabric restraint 13 is conductive. This may be accomplished by incorporating a small amount of metallic or conductive material, such as a powder, flakes or fibers, into the structure of fabric restraint 13, or optionally, by providing fabric restraint 13 with a plurality of conductive elements, such as wires, spokes or threads. Additionally, it is considered within the scope of the invention to incorporate other conductive material, other than metal, in the structure of fabric material 13, for example, carbon black or graphite particles. In order to form a path to ground, flexible charging device 1 may be provided, for example, with a grounding loop 19, sewn into fabric restraint 13. By forming fabric restraint 13 from a conductive material, any charge developed inside fabric restraint 13 may easily be discharged. If the fabric restraint 19 is not provided with conductive material, material

disposed inside flexible charging device 1 may ignite or cause other dangerous situations, such as explosions.

Fig. 3 shows a cross-section of the top of flexible charging device 1 (when in a discharge position) along the line indicated at A-A in Fig. 2. Inner liner 10 is placed inside fabric restraint 13 and mechanically attached by a stitching 15 through both a hem 14 on fabric restraint 13 and, for example, a welded seam 16 at the top of inner liner 10. Integration of inner liner 10 to fabric restraint 13 will assure that the liner remains in place and prevent the liner from collapsing and hampering product discharge. In order to reduce any risk of breaching containment, it is preferable to provide stitching 15 only where necessary, i.e., at weld seam 16 and/or window 18.

A lifting loop 17 is also optionally provided. Lifting loop 17 may be captured in stitching 15 at the top of the device, or attached in any other manner to flexible charging device 1. For example, lifting loop may be welded to the side of fabric restraint 13 or joined to sanitary fitting 12. This gives the user a means of suspending the device during unloading.

It is additionally considered within the scope of the invention to integrate grounding loop 19 with lifting loop 17, or to provide lifting loop 17 with a hinge, such that it may also be used to maintain flexible charging device 1 to permit suspension during filling and discharging. Alternatively, flexible charging device 1 may be provided with a second lifting loop 17 for such a purpose.

As described herein, flexible charging device 1 may be used to contain any variety of materials, such as powders, flakes, emulsions and liquids, and need not be limited to containing harmful or toxic materials. However, flexible charging device is particularly designed to contain and/or transport materials such as fine chemicals, toxic and/or hazardous waste, pharmaceutical compositions in dry or powder form, intermediate materials for pharmaceutical processing, and laboratory and pilot plant compounds, as well as pharmaceutical wet-cake material.

Although we have described the invention in connection with exemplary embodiments, the invention is not so limited and modifications thereof may be made by those skilled in the art without departing from the scope of the invention.

I claim:

1. A flexible material transfer device for transferring a load contained therein comprising:

a flexible inner liner, having a closed end and an open end;
a sanitary fitting affixed to the open end of the flexible inner liner; and
an outer restraint surrounding the inner liner.

2. The flexible material transfer device of claim 1, further comprising a window for viewing the load.

3. The flexible material transfer device of any of the preceding claims, wherein the inner liner is formed from a plurality of patterns, thermally welded or sewn together.

4. The flexible material transfer device of any of the preceding claims, wherein the sanitary fitting comprises a sealing element for forming an airtight seal with a filling device used to deliver material to be transferred, such that the material is substantially prevented from escaping.

5. The flexible material transfer device of any of the preceding claims, wherein the sealing element comprises at least one selected from the group consisting of an O-ring and a locking member.

6. The flexible material transfer device of any of the preceding claims, wherein the inner liner is formed from a polymeric material.

7. The flexible material transfer device of any of the preceding claims, wherein the inner liner is formed from a thermoplastic film.

8. The flexible material transfer device of any of the preceding claims, wherein the inner liner is formed from a polyolefin.

9. The flexible material transfer device of any of the preceding claims, wherein the inner liner is formed from a material selected from the group consisting of polyethylene, polypropylene, polybutylene, and the like.

10. The flexible material transfer device of any of the preceding claims, wherein the inner liner comprises at least one barrier layer to protect the contact of the load with the environment.

11. The flexible material transfer device of any of the preceding claims, wherein the at least one barrier layer is impervious to the load.

12. The flexible material transfer device of any of the preceding claims, wherein the inner liner is impervious to the load.

13. The flexible material transfer device of any of the preceding claims, wherein the outer restraint is formed from a flexible fabric.

14. The flexible material transfer device of any of the preceding claims, wherein the window is sewn over an opening in the outer restraint.

15. The flexible material transfer device of any of the preceding claims, wherein the flexible fabric is formed from a thermoplastic material.

16. The flexible material transfer device of any of the preceding claims, wherein the flexible fabric is formed from a material selected from the group consisting of linear and branched polyethylene, polypropylene, and polybutylene.

17. The flexible material transfer device of any of the preceding claims, wherein the flexible fabric is conductive.

18. The flexible material transfer device of any of the preceding claims, wherein the flexible fabric comprises at least one conductive material selected from the group consisting of powder, flakes, fibers, wires, spokes, and non-metallic materials and threads.

19. The flexible material transfer device of any of the preceding claims, wherein the non-metallic material is selected from the group consisting of carbon black and graphite particles.

20. The flexible material transfer device of any of the preceding claims, further comprises a grounding loop.

21. The flexible material transfer device of any of the preceding claims, wherein the grounding loop is attached to the flexible fabric.

22. The flexible material transfer device of any of the preceding claims, further comprising a lifting loop attached to the outer restraint.

23. The flexible material transfer device of any of the preceding claims, wherein the lifting loop is integrated with the grounding loop.

24. A method of transferring a load comprising:
providing a material transfer device, the transfer device comprising a flexible inner liner, having a closed end and an open end; a sanitary fitting affixed to the open end of the flexible inner liner; and an outer restraint surrounding the inner liner and filling the transfer device with the load.

ABSTRACT

The present invention is a material transfer device, utilizing flexible outer and inner liners. The present invention may additionally include a window for viewing the load disposed inside the device. By forming the transfer device from flexible materials, optionally, integrally formed with a sealing valve, charging and discharging of the transfer device are greatly enhanced.

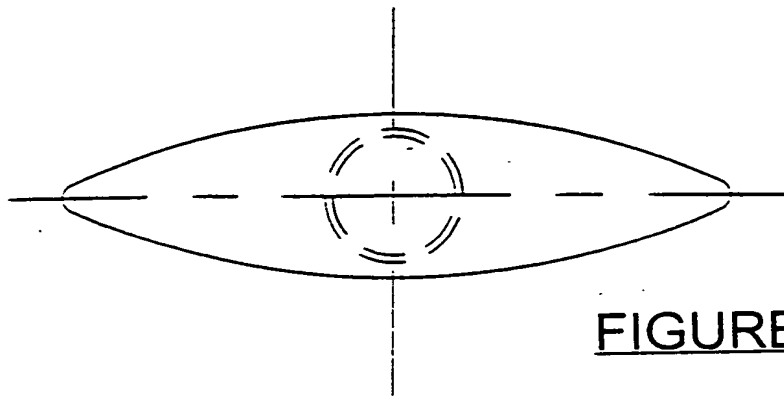


FIGURE 1a

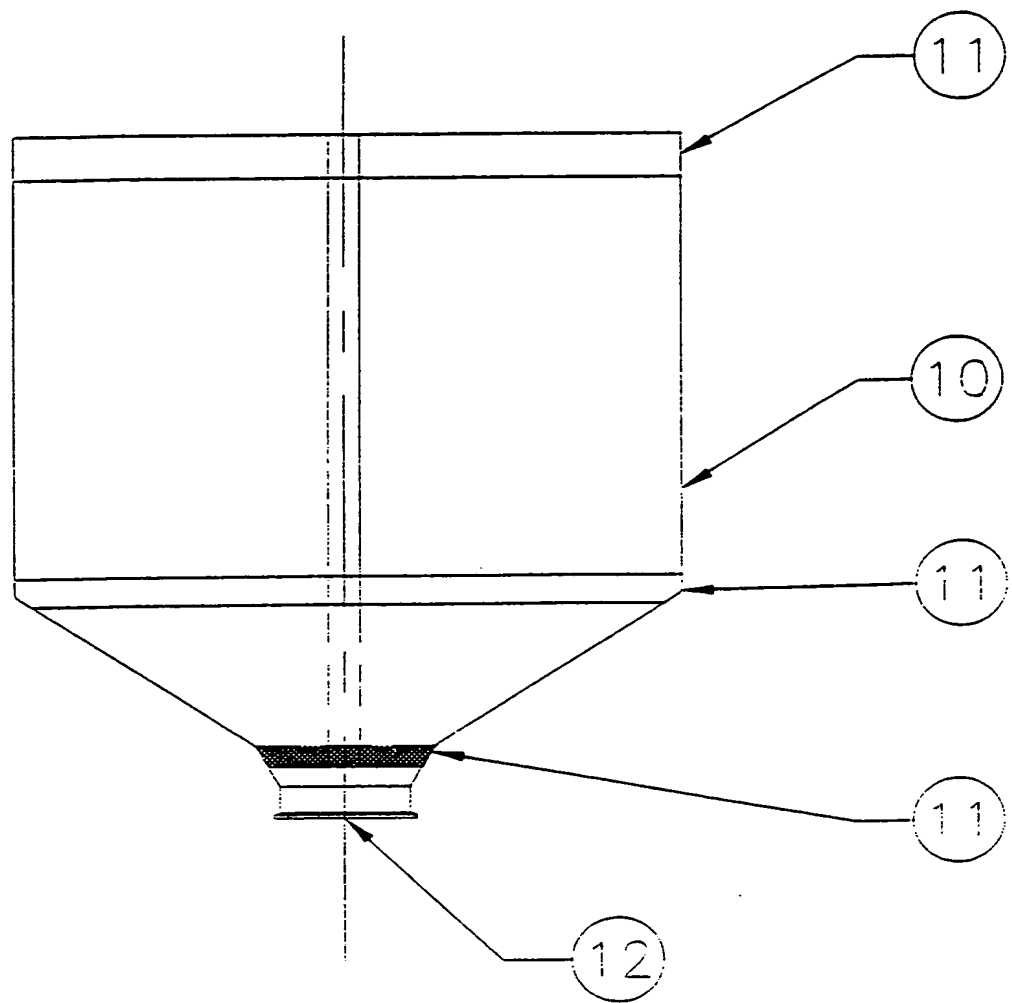


FIGURE 1

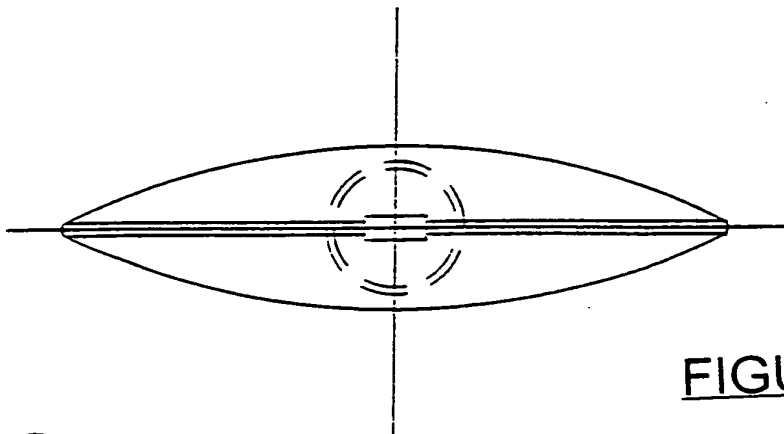


FIGURE 2a

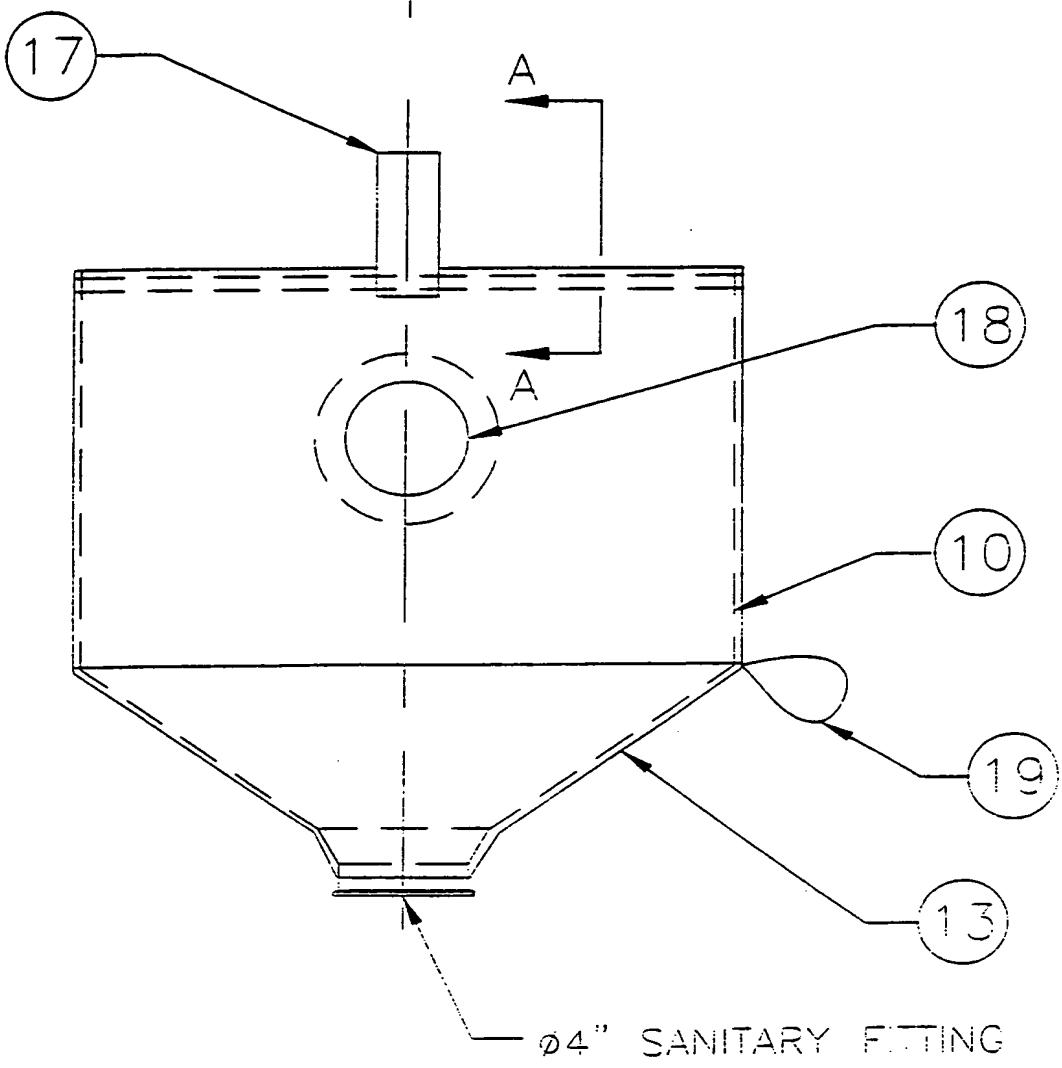
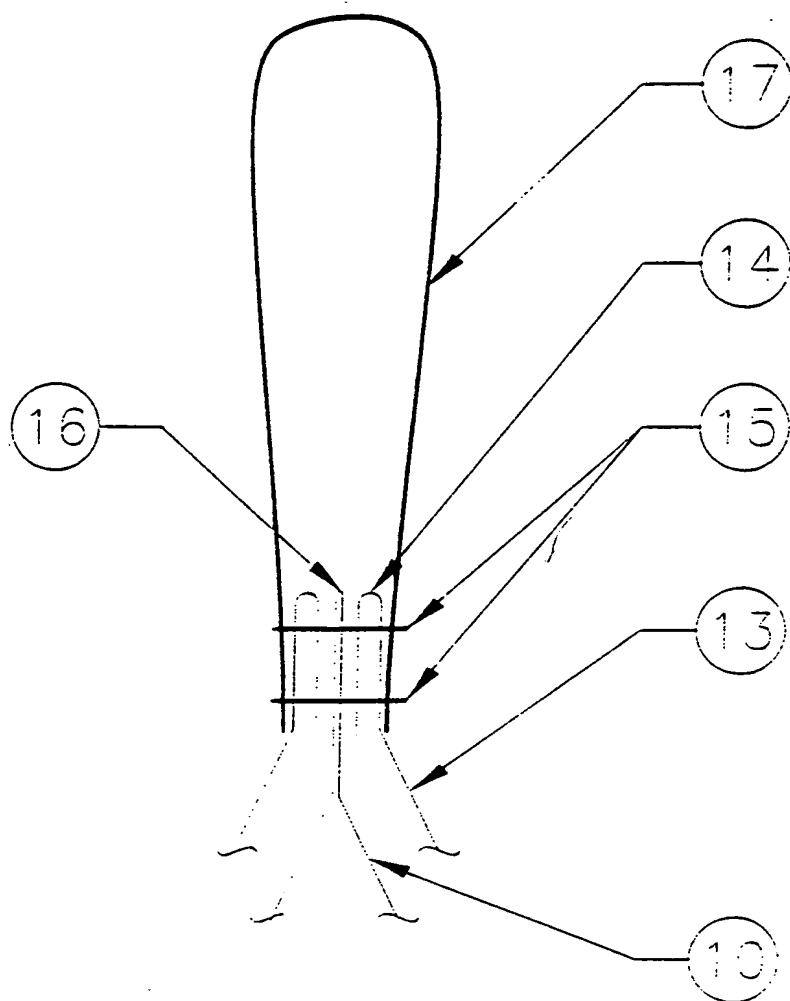


FIGURE 2



SECTION A-A

FIGURE 3